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# United States Department of Agriculture,

## FOREST SERVICE—Circular 61.

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### FOREST PLANTING LEAFLET.

#### HOW TO TRANSPLANT FOREST TREES.

The tree planter should endeavor always to transplant his trees with the least exposure of the roots. The root-hairs, or feeding cells, on the roots of a plant will shrivel up and perish if exposed to the dry atmosphere for even a few minutes. The roots of conifers are particularly sensitive, so that these require more careful attention in transplanting than do broadleaf trees. Some of the broadleaf species may have their roots dried out and shriveled, yet with proper attention revive and live; but the conifers, once dried, rarely regain their vitality.

#### THE PROPER SEASON.

The best time to transplant young trees is just before growth begins in the spring, when the seedlings are likely to receive the least injury. In general, planting should be done as soon as possible after the frost is out of the ground, the exact period depending upon local climate and soil conditions. In parts of the country where the winter is the only season with an abundant rainfall, the transplanting should be done during the rainy season.

Fall transplanting in the prairie States is usually unsatisfactory, since the dry, freezing weather of winter often damages the young shoots. In the States east of the Mississippi fall planting is more successful, though small seedlings are often likely to be heaved out by the frost if not protected by mulching.

Conifers, with the exception of the deciduous species, such as European larch and tamarack, may be safely planted somewhat later in the season than broadleaf trees.

It is always well to choose a wet or cloudy day for transplanting, but if the work must be done in dry weather the nursery beds or trenches should be thoroughly soaked a few days before removing the trees. By establishing a home nursery close to the planting site the disadvantages of shipment may be avoided, some expense may be saved, and the time for planting may be considerably extended. The last point is often of importance, because it may be inconvenient to drop other work in order to give a shipment of trees the immediate attention they require. Home-grown stock may be left in the nursery until a favorable opportunity for getting out the trees occurs.

#### TREATMENT BEFORE TRANSPLANTING.

As a rule, seedlings from one to three years old are the best for forest plantations, and those of most species require no preliminary



preparation. Older trees, however, and certain conifers like Coulter pine, western yellow pine, longleaf pine, and such broadleaf trees as form long taproots, should have their roots pruned in the seedbeds. This may be done late in the summer by running a "tree digger" under each row of trees and allowing the plants to stand undisturbed for another season, or, with small seedlings, the roots may be pruned with a sharp flat spade or a special implement designed for the purpose.

European foresters move young trees with balls of earth adhering to their roots, such trees being called "ball plants." Where the eucalyptus is cultivated on a large scale the seedlings are frequently prepared for easy transplanting by being grown in "flats" or seed boxes made of some durable wood. The plants may then be removed with a small block of earth attached to the roots.

When the trees to be moved are large they are often prepared by digging them partly out in the fall, so that a large ball of earth may be frozen to their roots. The block of frozen soil, with the tree in it, is moved during the winter season to a hole which was dug before the ground became frozen.

#### PUDDLING.

When a seedling or transplant is taken from the ground, its roots should immediately be plunged into a vessel containing a mixture of earth and water about as thick as cream. This mixture is known as "puddle," and is one of the most important requisites for successful tree planting.

The puddle may be prepared in a pail, tub, or barrel, according to the size and number of the trees to be transplanted, and may be carried or drawn along the rows where the digging is in progress. If the trees are to be planted immediately, the vessel holding the puddle may be used as a receptacle to carry them from the nursery to the planting sites.

#### HEELING IN.

If seedlings are received from a distance, the trees should be unpacked at once and their roots should be dipped into a puddle. After this the trees should be "heeled in" according to the following method until the time for planting in the field:

Dig a trench deep enough to bury the roots and part of the stems. The trench should run east and west, with its south bank at a slope of about 30 degrees to the surface of the ground. A layer of trees should be placed in the trench on its sloping side, the tops toward the south. The roots and stems should be covered with fresh earth dug from the second trench, in which a second layer of trees is put and covered in the same way. The digging of the parallel trenches

is repeated and layers of trees are put in until all have been heeled in. (See fig. 1.)

In the case of conifers care should be taken not to bury the foliage, and either to choose a shady place for the young trees or to construct a shade over them with brush or laths.

#### TRANSPLANTING IN NURSERIES.

With most species, especially with conifers, where seeds are planted in beds, it is necessary to transplant a portion of the young seedlings to nursery rows when they are one or two years old. This stimulates the growth of small roots, makes the plants much more vigorous than others of the same age not transplanted, and helps them to establish themselves better when permanently set out.

When the seedlings are dug from the seedbed they should be

dipped in a puddle and immediately be set in the nursery rows, or, if delay is necessary, they should be laid, roots together, in piles of a hundred or more, and the roots should be covered with wet blankets or with a few shovelfuls of fresh earth.

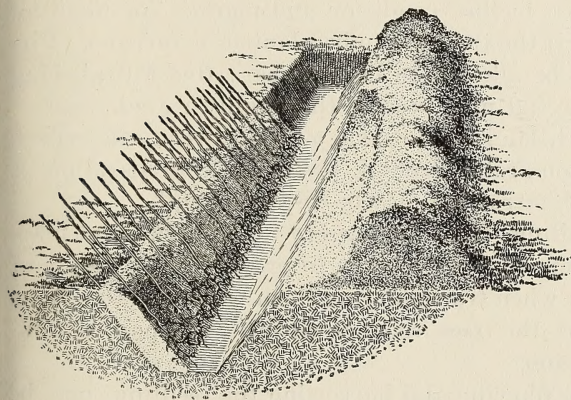


FIG. 1.—Heeling in young trees.

In ordinary nurseries which are to be cultivated by hand the rows for conifers should be 1 foot

apart and those for broadleaf trees 2 feet apart. Coniferous seedlings should be set 4 inches apart in the row and broadleaf seedlings about 6 inches apart. All plants should be set from 1 to 2 inches deeper in the rows than they grew in the seedbed. If the seedbeds are not wanted for another planting, the seedlings to be transplanted may be taken out in such a way that thrifty plants will be left with the same intervals as in the nursery rows. They should then be cared for the same as transplants.

Some trees, like the oaks, the walnut, and the catalpa, form long, fleshy taproots during the first season, with few lateral roots. This form of root is sometimes very troublesome to transplant. Before setting such plants in the nursery rows from one-fourth to one-third of the taproots should be cut off. A bundle of a hundred or more plants may be laid across a log and their taproots cut off with a sharp axe. Care must be taken not to bruise the part of the



root that is left. Seedlings with a bunch of short, fibrous roots need no cutting.

Following the transplanting of seedlings the nursery rows should be kept clear of weeds and the soil stirred frequently with hoe or cultivator. It is especially necessary that the nursery be gone over after a rain as soon as the surface soil is dried out sufficiently to work well. This will prevent the deeper moisture from drying out about the roots of the trees. In case no rain falls within two weeks after the plants have been set in the nursery, water should be applied to the rows. In dry regions frequent shallow cultivation to maintain a dust mulch should be given.

#### TRANSPLANTING FROM NURSERY TO FIELD.

On the plains and prairies, the land, provided it has not been in a cultivated crop the preceding season, should be plowed deeply in the fall previous to planting and left rough over winter. In the spring it should be worked to a mellow condition and marked for planting in check rows or listed if the trees are to be planted in furrows. Virgin prairie soil should be allowed to lie one year after fall plowing in order that the dense sod may become thoroughly rotted. Subsequent treatment of such land is the same as that already described. In the East, and on non-arable ground, preliminary preparation of the soil by plowing and harrowing may be dispensed with.

In transplanting seedlings from the nursery to the permanent place in the field, the same care should be taken to prevent the exposure of their roots to the air as when transplanting them to the nursery rows. The best plan is to carry the trees, roots downward, in a pail containing several inches of water.

On land prepared by plowing and harrowing the seedlings may be set in furrows plowed for this purpose or in the rows previously marked with a lister for guidance of the planters. In the latter case a spade may be used for opening the hole. On unprepared sites the seedlings are set in holes dug with a grub hoe or mattock. The width and depth of the hole depends on the character and size of the plant's root system. In all tree planting it is of the greatest importance to press the earth firmly about the roots so that all air spaces are filled. The soil should not, however, be packed so hard as to be impervious to water nor should the earth be raised in a mound about the stem. In dry regions it is always desirable to leave a slight depression around the collar of the plant in order to collect any moisture that may fall.

Approved:

JAMES WILSON,

*Secretary.*

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